Log Event B

Borehole 41-07-12

Borehole Information

Farm : SX	**Tank :** SX-107	**Site Number :** 299-W23-73
N-Coord : 35,397	**W-Coord :** 75,668	**TOC Elevation :** 663.17
Water Level, ft :	**Date Drilled :** 2/16/1962	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 75	
Type : Steel-welded	Thickness : 0.226	ID, in. : 4
Top Depth, ft. : 0	Bottom Depth, ft. : 88	

Cement Bottom, ft. : 88 **Cement Top, ft. :** 85

Borehole Notes:

Borehole 41-07-12 was drilled in February 1962 to a depth of 75 ft with 6-in. casing. Data from the drilling log were used to provide borehole construction information. In 1978, the borehole was deepened to 90 ft, the 6-in. casing was extended to 85 ft, and a 4-in. casing was placed inside the original 6-in. casing to a depth of 88 ft. The bottom of the borehole was backfilled with grout from 88 to 85 ft. The annulus between the 4-in. casing and the 6-in. casing was stemmed with grout from 8 ft to the ground surface. The drilling log did not indicate if the borehole was perforated. The thickness of the 6-in. casing is presumed to be 0.280 in.; the thickness of the 4-in. casing is presumed to be 0.250 in.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1997	**Calibration Reference :** GJO-HAN-20	**Logging Procedure :** MAC-VZCP 1.7.10-1

Logging Information

Log Run Number : 1	**Log Run Date :** 01/15/1998	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 77.5	**Counting Time, sec.:** 50	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Logging Operation Notes:

This borehole was logged by the SGLS in a single log run. The top of the casing, which is the zero reference for the SGLS, is assumed to be approximately flush with the ground surface. The total logging depth achieved was 77.5 ft. The 50-s counting time used to log this borehole was half of that normally required because this is a repeat log, which was run to determine if there has been any changes in the vadose zone contamination.

Analysis Information

Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/05/1998

Analysis Notes :

The pre-survey and post-survey field verification for the log run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

This borehole is somewhat unusual in the SX Farm because it is double cased. The casing correction factor for a 0.65-in.-thick steel casing was applied during the analysis of the data collected from the initial logging event in 1995 (Event A) because the combined thickness of the the double casing was reported to be 0.62 in. However, a casing correction factor for a 0.50-in.-thick steel casing was applied during analysis of the data collected from the most recent logging event (Event B) because it is thought to be more accurate. Consequently, the reported activities calculated for Event A were slightly higher than those calculated for Event B. To determine if a change in radionuclide concentrations had occurred between 1995 and 1998, the new data were also processed using the 0.65-in. casing correction and used for comparison with the old data set. No change was found.

Shape factor analysis provides insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides. A 50-s counting time used during the most recent logging event resulted in counting statistics that were inadequate to produce reliable shape factor results. Therefore, spectra collected from the initial logging event in 1995, which utilized a 100-s counting time, were used to generate shape factor results for this borehole.

Log Plot Notes:

A data plot is presented that compares the SGLS data collected during the baseline logging event (Event A) in May 1995 with the SGLS data collected during the subsequent monitoring event (Event B) in January 1998. The man-made radionuclide data and the total gamma activity derived from the spectral data from each event are used in the data comparison. Uncertainty bars and MDLs are not included on these plots.

A separate plot of the thermal neutron count rate data shows the relative variation in the moisture content of the sediments surrounding this borehole. These data are also useful for interpreting borehole construction.

A plot of the spectrum shape factors is also presented. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

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A combination plot includes the SGLS man-made and natural radionuclide data and the total gamma activity derived from the spectral data. Also included is the profile of the thermal neutron count rate data obtained from the neutron-neutron moisture logging system.

Results/Interpretations:

As described previously, the 1998 SGLS data were collected using a 50-s counting time, which is half of that normally used. This resulted in a MDL that was higher than the MDL associated with the baseline log data collected in 1995. Consequently, some regions of very low Cs-137 contamination between 10 and 77.5 ft that were detected in 1995 were not detected in 1998. Accordingly, the distribution of the man-made radionuclide contamination detected by the SGLS in 1995 is discussed below.

The man-made radionuclide Cs-137 was detected in this borehole. The Cs-137 was detected nearly continuously from the ground surface to a depth of 20 ft. Two small zones of continuous Cs-137 contamination were detected from 54 to 56 ft and from 61 to 64 ft. Intermittent zones of isolated and continuous Cs-137 contamination were detected elsewhere around the borehole between 23 ft and the bottom of the logged interval (77.5 ft).

The comparison of the 1995 and 1998 SGLS data shows excellent repeatability of the Cs-137 profiles in regions where the concentrations of Cs-137 exceed about 1 pCi/g. There is no indication of an increase in contamination in the vadose zone sediments surrounding this borehole since 1995; thus, there is no indication of a tank leak in this region.

Additional information and interpretations of the log data are provided in the Tank Summary Data Report and Vadose Zone Reassessment Report for tank SX-104.